NOTES ON MOSQUITOES FROM AN AREA OF ENDEMIC YELLOW FEVER IN COLOMBIA

(DIPTERA, CULICIDAE)

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During the summer of 1935, the writer visited an area of endemic (jungle) yellow fever in the Intendencia of Meta, Colombia, in the eastern foothills of the Andes, to make a survey of the mosquito fauna of the region. The results of this survey were published in April 1936 (Komp, 1936a). Several new species were found in the area by the writer, and were later described. During the nearly 20 years since the publication of his results, mosquito taxonomy has advanced considerably, and several species misnamed by the writer have been described by others. These emendations and corrections will be noted below in their proper places, reference being made to the species as numbered in the original paper (Komp, 1936a).

No. 17. *Goeldia* n. sp. The larval skin and the corresponding female adult have been lost; no description of this larva has been published by the writer. What this species may be is not known.

No. 18. *Joblotia digitata* is now known as *Trichoprosopon digitatum* (Rondani). The genus has been revised by Stone (1944).

No. 20. *Psorophora ferox* Humboldt. Yellow fever has been transmitted by the bite of this species by N. C. Davis, using Asibi virus, but Whitman and Antunes (1937), who published Davis's experiments after his death, were unable to confirm his results. Whitman and Antunes say "The results with *Psorophora ferox* are confusing. Davis, in experiments reported in this paper (Whitman and Antunes, 1937) for the first time, was able to transmit yellow fever by the bite of this mosquito, but we have been unable to repeat these observations." *P. ferox* is no longer considered to be a vector of jungle yellow fever.

No. 25. *Haemagogus janthinomys Dyar.* Kumm *et al.* (1946) have shown that *janthinomys* is a synonym of *spegazzinii* Brèthes. Subsequent dissection of the male terminalia of specimens reared from larvae collected at Restrepo showed them to be the common subspecies *spegazzinii falco* Kumm *et al.* However, Dr. L. E. Rozeboom informs me that he later obtained males of *spegazzinii* near Villavicencio, some 20 kilometers from Restrepo. In 1944, when the writer visited the Yellow Fever Laboratory of the Rockefeller Foundation at Villavicencio, he collected from tree holes larvae which produced males of *Haemagogus regalis* (*lucifer* is a synonym (Komp, 1954)). Dr. Marston Bates then informed him that he suspected that about two percent of all adult *Haemagogus* collected in the Villavicencio region were *regalis*. The adult females of *regalis* are indistinguishable from those of *falco* or *spegazzinii*.

No. 26. *Aedes leucocelaenus* Dyar & Shannon. According to Galindo *et al.* (1952) the species obtained by the writer at Restrepo, and of which the male was described (Komp, 1938), is a new species. They state on page 531: "Komp has informed us (in a letter to H. T. dated April 18, 1951) that this illustration

[1]Deceased December 7, 1955. See obituary, p. 47.—ED.

[of the male terminalia] was drawn from a male taken at Restrepo, Colombia. . . . This new species [from Restrepo] will be described by Komp separately.'' This has not yet been done. The form found in the Restrepo area was rare, and only a few larvae were collected from narrow, deep tree holes. Because of its rarity in the area, it is probably not an important vector of jungle yellow fever there. One of the forms found around Rio de Janeiro, Brazil, was found infected in nature in 1938 (Shannon *et al.*, 1938). It seems to be much more common in southern Brazil than it was in the Restrepo area.

No. 29. *Aedes angustivittatus* D. & K. This species was identified by larval characters given by Dyar (1928, p. 151). The thoracic ornamentation of the adult seems to be subject to considerable variation, in some specimens making it resemble *Aedes scapularis* Rondani.

No. 31. *Aedes scapularis* Rondani. Laemmert and Kumm (1950) infected monkeys with yellow fever by the bite of *A. scapularis*. It was also very common during an epidemic of yellow fever in the Valle do Chanaan, State of Espirito Santo, Brazil, in 1932.

No. 32. *Aedes terrens* Walker. This species is undoubtedly part of a complex, such as described for *A. leucocelaenus* by Galindo *et al.* (*1952*). The form found in Restrepo differs in the larva and male terminalia from material obtained in Panama, Costa Rica, Trinidad, and elsewhere in the Neotropical region. The writer has specimens of at least four forms of this complex; one of them from the Panama Canal Zone has the fifth hind tarsal segment of the adult white. In another very common form from Panama, reared from identical larvae, the mesonotum of the male may be silvered across anteriorly, or have the silvery scales separated by an area of dark scales. *A. thorntoni* D. & K., a member of the *terrens* complex, is known only from a few females collected at Bluefields, Nicaragua.

No. 33. *Aedes dominicii* Rangel & Romero Sierra. This species is *whitmorei* Dunn 1918. The writer obtained the type series from Col. Eugene Whitmore, for whom L. H. Dunn named the species. The series was deposited in the U. S. National Museum. *A. whitmorei* is a member of a subgenus of *Aedes* described as *Soperia* by the writer in 1936 (Komp, 1936b). The type series, according to Dyar (1928, p. 231) was ''bred from larvae said to have been found in a pool at Emerald Mines, Muzo, Colombia,'' and further, ''Major Dunn, who collected them, had one male but he did not give it to me. . .'' This specimen, belonging to the type series, was examined by the writer, and found to be a female without a head. The spermathecae had been crushed against the legs and extruded, giving the appearance of the two side-pieces of a male. The known breeding places of *A. whitmorei* are saxicolous bromeliads, and it is probable that one such plant, containing larvae, had fallen into a ground-pool, where Dunn collected them.

No. 34. *Aedes*, new species. This was subsequently described by the writer as *Aedes* (*Soperia*) *pseudodominicii* (1936b). In coloration it much resembles *A. whitmorei*. All the males were captured, and the mesonotal markings were rubbed. The male terminalia are quite different from those of *A. whitmorei*. Neither species has terminalia with claspettes. No associated larvae were obtained.

No. 35. *Aedes septemstriatus* D. & K. The larva of this species has not been described, as the writer's material has been lost.

No. 41. *Culex* (*Carrollella*) *iridescens* Lutz. Dyar (1928), in a key to the larvae of *Culex*, does not separate those of *secundus* from *iridescens* (see dichotomy 51b, p. 280). The subgeneric name *Carrollia* was given to *iridescens* by Lutz in 1905. The name *Carrollella* Lutz dates from 1921 (Dyar, 1928, p. 269). It is not known why Dyar used the subgeneric name *Carrollella* in "The Mosquitoes of the Americas" (1928, pp. 280-285).

No. 45. *Culex* (*Carrollella*) *infoliatus* B.-W. & B. The writer remains of the opinion that *bihaicolus* D. & N. T. 1927 is a synonym of *infoliatus*. As stated, Dyar found no characters whereby the larvae of the two supposed species can be distinguished, and "the single slide of the male terminalia of *bihaicolus* in the U. S. National Museum collection is in such poor shape that no details can be made out" (Komp, 1936a, p. 64). However, Lane (1953, p. 497) gives a key to the male terminalia of *bihaicolus* and *infoliatus*, and treats them as distinct species on pages 509 and 510, respectively.

No. 48. *Culex* (*Mochlostyrax*) *distinguendus* Dyar. This species was described (Dyar, 1928, p. 305) without a figure of the male terminalia. Rozeboom and Komp (1950, fig. 25) give a figure taken from the lectotype selected by them: Slide 2327 U. S. N. M. The material collected in Restrepo has been lost, but Dr. R. H. Foote of the U. S. National Museum has described the larvae (1954) from material obtained elsewhere.

No. 50. *Culex* (*Mochlostyrax*) *inhibitator* D. & K. This is probably *Culex erraticus* D. & K. 1905, according to King and Bradley (1937). They say (p. 355) "Several of the species described from the American tropics appear to be indistinguishable from *erraticus*, as now defined, and are provisionally included in its synonymy." The type locality for *inhibitator* is the island of Santo Domingo (Hispaniola).

No. 51. *Culex* (*Mochlostyrax*) *bastagarius* D. & K. This name has many synonyms, including *vapulans* Dyar 1920, *alfaroi* Dyar 1921, *innominatus* Evans 1924, and *cuclyx* D. & S. 1924. Rozeboom and Komp (1950) give a figure (Fig. 10) of the male terminalia.

No. 54. *Culex* (*Microculex*) sp. The terminalia of the male specimen were later dissected, and the species was found to be *C.* (*Microculex*) *stonei* Lane & Whitman 1943. Lane (1953, vol. 1, p. 521) gives the distribution as Trinidad, B. W. I., and states that *ocellatus* D. & K. 1905 is a synonym. The *C.* (*Microculex*) *ocellatus* of Theobald 1903 is a *Melanoconion*, later described as *C. automartus* Root (Rozeboom & Komp, 1950, fig. 59).

No. 67. *Anopheles* (*Nyssorhynchus*) *bachmanni* Petrocchi. This species is now known as *Anopheles* (*N.*) *triannulatus* Neiva & Pinto 1923. The latter name was given to an aberrant specimen, with extra black rings on the hind tarsi, such as occur in *A. albimanus bisignatus* and *trisignatus* Hoffman, from Mexico and the lower Rio Grande valley in Texas. The usual form of *triannulatus* has only the base of the fifth hind tarsal segment black.

No. 68. *Anopheles* (*Nyssorhynchus*) *tarsimaculatus* Goeldi. This is *A.* (*N.*) *rangeli* Gabaldon *et al.* (1940). It was determined as such by examination of the male terminalia. The distribution given by Russell, Rozeboom and Stone

(1943, p. 49) as Trinidad, B. W. I., is erroneous, the locality being La Trinidad, Venezuela. The writer has seen specimens collected by F. M. Root from this locality, in the collection of the School of Hygiene and Public Health, Johns Hopkins University. *A. rangeli* was not found in Trinidad, B. W. I., during an extensive survey by Downs, Gillette and Shannon (1943, p. 29).

No. 69. *Anopheles* (*Nyssorhynchus*) *albitarsis* Arribalzaga. This is *A.* (*N.*) *pessoai* Galvão & Lane (1936). Lane (1953) makes *A. pessoai* a synonym of *A. braziliensis* (Chagas) 1907, but gives no reason for the change in nomenclature. Russell, Rozeboom and Stone (1943, p. 48) give the name as *pessoai* and the incorrect date 1937, as does Lane in Boyd's "Malariology," Vol. 1, p. 403, 1949.

No. 77. *Anopheles* (*Kerteszia*) *boliviensis* Theobald. Dr. Ernesto Osorno M. (Komp and Osorno M., 1936) "in January, 1936 . . . succeeded in breeding from larvae found in bromeliads near Restrepo two males of this species. The corresponding larval skins were preserved. . . . In *boliviensis* the single elements of the palmate hair are slender, lanceolate, with pointed tips. . . . The obvious differences separating the species from the common *A. bellator* of Panama [now known to be *neivai* H., D. & K. (Komp, 1937)] are, in the female, the presence of scales on the abdominal segments. . . ." No other species of *Kerteszia* has scales on the abdominal tergites. This species occurs also in Peru and Bolivia (Songo, Bolivia, is the type locality).

No. 78. *Anopheles bellator* D. & K. A mixture of species was described here. The larvae collected by Dr. Jorge Boshell from uncut bamboo stems produced females, which the writer later described as *A.* (*K.*) *bambusicolus* (Komp, 1937). The larvae collected from saxicolous bromeliads by Dr. E. Osorno-Mesa produced adults of a species later described as *A.* (*K.*) *homunculus* by the writer (1937). This species is also found in Trinidad, B. W. I. The writer also described (1937) *A.* (*K.*) *anoplus* from a single male produced from a larva collected at Restrepo by Dr. Osorno. "This larva was found in a bromeliad, and was thought to be the same as that of *homunculus*. However, on examining the male terminalia, the mesosomal leaflets found in *homunculus* were not present in *anoplus*, although the form of the ventral lobe is nearly the same. . . ." Lane (1953, p. 287) makes *anoplus* a synonym of *homunculus*, stating "The leaflets [of the mesosome] can be vestigial or absent."

Regarding *A. bambusicolus*, the writer again found larvae in uncut bamboo internodes, some at 35 feet from ground level, north of Villavicencio, Colombia, in 1944. Unfortunately, no males were reared from these larvae. Lane (1953) gives figures (265, p. 282) of the male genitalia of *A. bambusicolus*, with the legend ". . . based on Coutinho 1946, thesis, 78, figs. 11 and 12. . ." Two theses by Coutinho are quoted in Lane's references, neither dated 1946. One is dated 1947 (Fac. Med. S. Paulo (Thesis) 53), and the other is dated 1950 (Fac. Med. S. Paulo (Thesis) 58). However, the files of the U. S. National Museum on Culicidae contain a thesis by Coutinho dated December 1947 (Coutinho, 1947), which gives distributional data only, stating on page 74 that *A. bambusicolus* was found in Londrina, State of Paraná, Brazil. This thesis contains no figures. If Coutinho presented two theses, one in 1947 and one in 1950, the files of the U. S. National Museum contain no evidence of the 1950 Coutinho thesis men-

tioned by Lane. We suspect an error of citation by Lane. The male genitalia of *A. bambusicolus* were described and figured by Coutinho (1946), but the figure given in this paper bears no resemblance to that copied by Lane (1953) and given as figure 265 (page 282). The question remains unsolved as to the origin of the latter figure, as it is entirely different from the one originally presented by Coutinho (1946).

Addenda

In addition to the Anopheline species mentioned above, males of *A. pseudopunctipennis* Theobald were captured in the forest near Villavicencio by the writer in 1944; larvae of *A. darlingi* Root were collected from roadside pools with grass along the road from Villavicencio to Restrepo during the same period. In spite of the presence of this dangerous vector, malaria did not seem to be a problem either in Restrepo or Villavicencio. Altogether, about 20 species of Anopheles are known from the Restrepo-Villavicencio area. Bates (1949) refers to the colonization of *A. strodei* Root in his Villavicencio laboratory, and Antunes (1937) found *Anopheles* (*Lophopodomyia*) *squamifemur* at Vega Grande; Municipio of Restrepo, in 1935.

Summary

This paper corrects certain errors of identification made by the writer in 1936 (Komp, 1936a), and gives bibliographical references to several new species of mosquitoes later described by him and others from the Restrepo-Villavicencio area in Colombia. Some notes on revised nomenclature are given, as well as the relation of some species to sylvan yellow fever.

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ANNOUNCEMENT

Short scientific articles, not illustrated, two double-spaced typewritten pages in length, are welcome and will usually receive prompt publication. References to literature should be included in the text.